

Patent Claims

1. Device for applying a coating medium onto a substrate, in particular for the application of a lubricant onto a sheet metal that can be fed into a deep drawing press, having at least one spray valve (4) that has a nozzle opening (6) that can be adjusted with regard to its effective outlet area using a closing mechanism (7) that can be positioned by an allocated positioning device, whereby the substrate can be moved past the spray valve, which can be supplied with the coating medium under pressure via a supply line (11), **characterized in that** the closing mechanism (7) can be adjusted continuously within a prespecified adjustment field using the assigned positioning device, whereby the positioning device is assigned a regulator (16) that has at least one target value input (17) for the instantaneously required outflow rate of the coating medium from the spray valve (4) and at least one actual value input (18) for the mass flow rate through a supply section arranged in front of the nozzle opening (6), and from the deviation, the regulator forms an adjustment signal that moves the positioning device in the direction to offset the deviation.
2. Device according to claim 1, **characterized in that** the target value can be adjusted depending on a coating thickness profile desired over the length of the substrate (1) running in the transport direction.
3. Device according to one of the preceding claims, **characterized in that** the position of the substrate (1) within its path passing the spray nozzle (4) can be detected via a path measurement device (28, 29), whose output is at the input of a target value control element (22) constructed as a computer in which the desired coating thickness, preferably in the form of a coating thickness profile, is saved and which forms the target value for the outflow rate from this instantaneous value of the position of the substrate (1) and the coating thickness allocated to this position.
4. Device according to claim 3, **characterized in that** the path measurement device (28, 29) is assigned to the conveyor device (2) that transports the substrate (1) by the spray valve (4).
5. Device according to claim 3 or 4, **characterized in that** the beginning of the path measurement can be activated by the substrate and that the devices of the spray valve (4) can be turned on or off by the target value control element (22) in advance of the opening of the nozzle opening (6).
6. Device according to one of the preceding claims, **characterized in that** the regulator (16) has an additional target value input (34) for the desired temperature of the coating medium and an additional actual value input (35) for the temperature in a supply section arranged before the nozzle opening (6) and from

the deviation, forms a control signal for adjusting a heating device (31) allocated to a supply section arranged before the nozzle opening (6).

7. Device according to one of the preceding claims, **characterized in that** the spray valve (4) can be impinged via a pressure line (14) with spraying air for spraying the coating medium and that in the pressure line (14), a valve (15) is arranged that can be turned on using the regulator (16) when the nozzle opening (6) is opened, and vice-versa.
8. Device according to one of the preceding claims, **characterized in that** a mass flow rate measurement element is arranged before the actual value input (18) and has a Venturi-type diaphragm (24) with a pressure regulator (25) allocated to it.
9. Device according to claim 8, **characterized in that** in the mass flow rate measurement element, a temperature sensor (36) is integrated, which is arranged before the actual value input (35) of the regulator (16).
10. Device according to one of the preceding claims, **characterized in that** the spray valve (4) has a spraying head (4a) with a conical nozzle opening (6) emerging from a storage chamber (5) connected to the supply line (11), whereby the nozzle opening (6) has a valve needle allocated to it that forms the closing mechanism (7) and that can be moved axially using a drive device (8) constituting the positioning device, which can be regulated by the regulator (16).
11. Device according to claim 10, **characterized in that** the drive device (8) is constructed as a linear motor, preferably in the form of a lifting magnet arrangement having a coil that can be impinged with current, whereby the current supply to the coil can be regulated using the regulator (16).
12. Device according to one of the preceding claims, **characterized in that** the regulator (16) is constructed as a programmable microprocessor.
13. Device according to one of the preceding claims, **characterized in that** a display device (38) and/or a recording device (39) is/are provided for the display and/or recording of the deviations and/or their components in the form of the actual outflow rates and the associated target values.
14. Device according to one of the preceding claims, **characterized in that** the spray valve (4) is provided with an integrated regulation device (40) that contains the regulator (16).
15. Device according to one of the preceding claims, **characterized in that** over the width of the substrate (1), several spray valves (4) are provided, each controllable by a regulator (16), and that the regulators (16) of all spray valves (4) are connected to a common target value control element (22) which is constructed as

a computer and has at least one memory register, in which the coating thickness values of the zones that are allocated to the spray valves (4) and possibly the temperature of the coating medium are saved, and which forms the target values for all spray valves (4).

16. Device according to claim 15, **characterized in that** the target value control element (22) is connected via a data bus (26) to the regulators (16) of the associated spray valves (4).